Assignment 2: Hubs and foci

Sociology 204: Social Networks

Due: Wednesday, February 18, 2015

*Remember to write your name and precept time on your assignment and staple it!*

1) Given the results of the beta model --- Watts and Strogatz (1998) --- what would you expect to be true of the network of relationships on Facebook? [10 points]

1. clustering coefficient much higher than an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length much higher than an Erdos-Reyni random graph with the same number of nodes and edges
2. clustering coefficient much higher than an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length about the same as an Erdos-Reyni random graph with the same number of nodes and edges
3. clustering coefficient much higher than an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length much lower than an Erdos-Reyni random graph with the same number of nodes and edges
4. clustering coefficient about the same as an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length much higher than an Erdos-Reyni random graph with the same number of nodes and edges
5. clustering coefficient about the same as an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length about the same as an Erdos-Reyni random graph with the same number of nodes and edges
6. clustering coefficient about the same as an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length much lower than an Erdos-Reyni random graph with the same number of nodes and edges
7. clustering coefficient much lower than an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length much higher than an Erdos-Reyni random graph with the same number of nodes and edges
8. clustering coefficient much lower than an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length about the same as an Erdos-Reyni random graph with the same number of nodes and edges
9. clustering coefficient much lower than an Erdos-Reyni graph with the same number of nodes and edges & characteristics path length much lower than an Erdos-Reyni random graph with the same number of nodes and edges

For each of the following distributions, please indicate whether you think it follows a power law or not.

2) Distribution of shoe sizes in the United States [5 points]

power law distribution

Not a power law distribution

3) Distribution of wealth in the United States [5 points]

power law distribution

Not a power law distribution

One important feature of a network is whether it is directed or undirected. For each network, please indicate whether it is directed or undirected.

4) friendships on Facebook [2 points]

Directed

Undirected

5) following on Twitter [2 points]

Directed

Undirected

6) links on Wikipedia [2 points]

Directed

Undirected

7) When studying the needle sharing network among drug users for the purposes of understanding the spread of HIV, does it make more sense to study this network as a directed or undirected network? [5 points]

Directed

Undirected

8) Why? [5 points]

9) What is one question or issue that you would like to discuss in precept? [9 points]

10) Barabasi and colleagues have claimed that most networks have “scale-free” degree distributions. It is the case, for example, that Hartsfield-Jackson Airport in Atlanta had almost 1,000,000 take-offs or landings in 2007. This is certainly thousands of times more flights than smaller airports like Ithaca, NY. But, is the human acquaintanceship network “scale-free”? Do there seem to be similar “hubs”? We will use the data that has already been collected by Facebook to try to decide. [If you don’t have a Facebook account please use a friend’s account.] How many friends do you have on Facebook? [1 point]

11) Now pick 10 of your friends on Facebook who you think have the most friends. How many friends does each of them have? [1 point]

12) Do any of them have twice as many friends as you? 10 times as many friends? 100 times as many friends? What does this suggest about the existence of ``hubs'' in the acquaintanceship networks? [5 points]

13) Now let's look at a different network: Twitter. According to this blog post from The Telegraph in 2012 (http://www.telegraph.co.uk/technology/news/9601327/Average-Twitter-user-is-an-an-American-woman-with-an-iPhone-and-208-followers.html), the average Twitter account has 126 followers. Assume that this is still true today. Now visit http://twitaholic.com/ and see the number of followers for the 10 most popular people on twitter. What does this suggest about whether the Twitter network is scale-free? Use data to support your answer. [5 points]

14) Feld (1981) called attention to the extra-network bases for friendship ties and defined a focus as a ``social, psychological, legal, or physical entity around which joint activities are organized.'' What do you think are the 3 most important foci for your own friendship network? [3 points]

15) Follow the instructions here to visualize your personal Facebook network using Gephi: https://msalganik.wordpress.com/2015/02/12/visualizing-your-personal-network-on-facebook/ Write a short summary of the patterns that you see. How does this relate to the ideas in Feld (1981)? Be specific. Be sure to include a copy of your visualization. [40 points]

15 [alt]) If you are not able to complete question 15 for some reason, write a one page response that summarizes force directed graph drawing algorithms and explains why they might cause your personal network to automatically divide into communities that are driven by foci. Note that we have not read anything about force directed graph drawing so you will need to do a bit of your own research to answer this question.